On top of this foundation rests the bottom of the reservoir, which is 6 in. thick and reinforced in a manner similar to the foundation, except that the bars are ½ in. square and 6 in. from centre to centre.

The top of the foundation was coated with a thin layer of coal-tar, the object being to provide for expansion and contraction of the bottom independent of the foundation.

Side-Walls.—The thickness of the concrete side-walls is 7 ft. 6 in. at the base, 2 ft. 5 in. at the ground line, and 12 in. at the top. The pressure of the water is carried by hoop tension, the side-walls being reinforced circumferentially with corrugated round bars, under the assumption that the concrete carries no tension. There are three lines of 1¼-in. round bars at the bottom and two lines of ¾-in. round bars at the top, the sections and spacing being varied from bottom to top to correspond with the pressure. It was intended to allow a stress of 15,000 lb. per sq. in. on the bars. Owing to an error in the calculation, which, happily, was on the safe side, an excess of steel was used, making the stress per square inch somewhat less than originally contemplated.

The thickness of the concrete wall was fixed at each point so that the concrete would not be stressed more than 290 lb. per sq. in., under the assumption that no vertical cracks would develop under this tension. Assuming the modulus of elasticity of steel at 30,000,000 and concrete at 3,000,000, the actual maximum stress, if no vertical cracks develop, will be 2,900 lb. per sq. in. of steel and 290 lb. sq. in. of concrete.

The following formulas were used in determining the dimensions and spacing of the steel bars and the thickness of the concrete:

A = Area of bars, in square inches per foot of height of wall;

D = Vertical distance, in inches, between two layers of bars at the point selected;

T = Thickness of concrete wall, in inches, at the point selected;

p = Water pressure, in pounds per square foot, at the point selected;

r = Radius of reservoir, in feet;

s = Stress in steel, in pounds per square inch, allowed, under the assumption that the concrete carries no tension;

c = Stress in concrete, in pounds per square inch, allowed;

a = Area, in square inches, of steel in each layer.

The area of the bars required per foot of height of wall is

$$A = \frac{p\,r}{s}$$

The vertical distance between the layers of bars is

$$D = \frac{12\,a}{A}$$

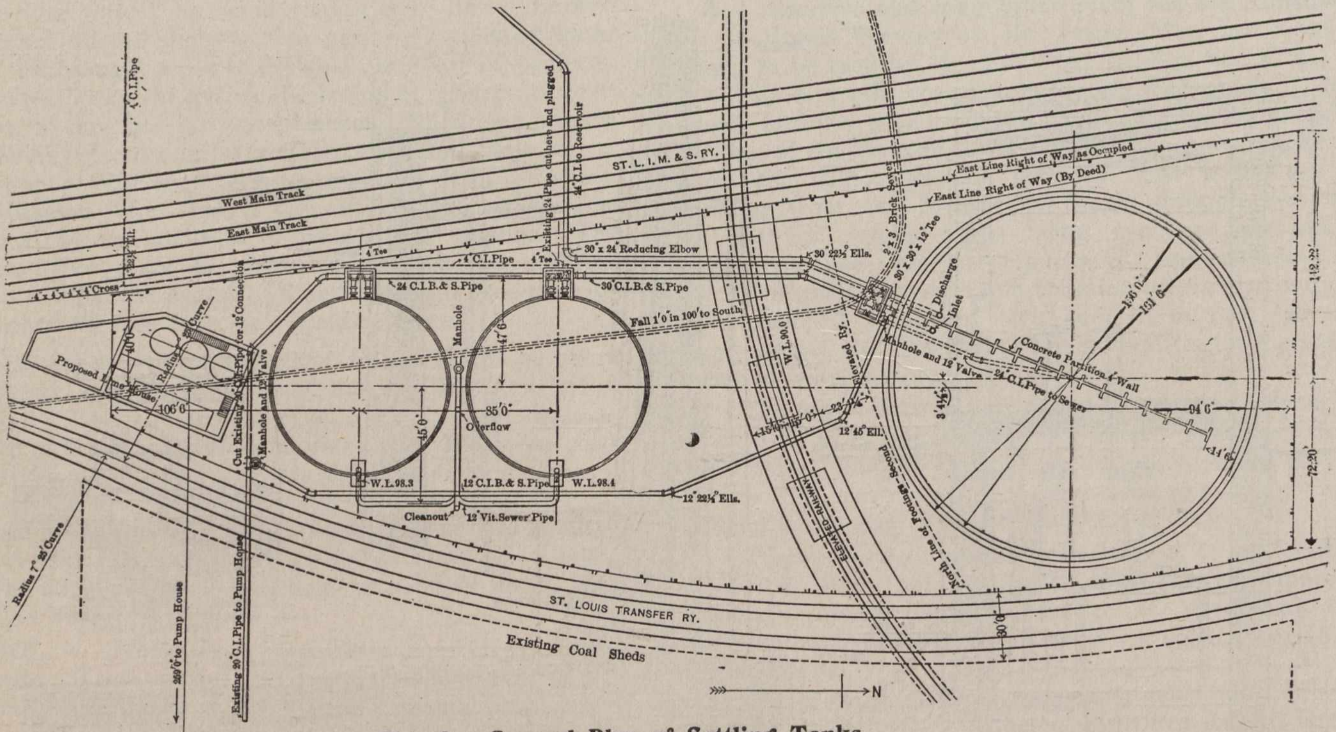

Fig. 2.—General Plan of Settling Tanks.

The thickness of the concrete wall at any point is

$$T = \frac{p\,r - 9\,A\,c}{12\,c}$$

The reinforcing bars were held in position by angle-iron frames, the sides of the angles being punched accurately with small holes for the insertion of the wires which tied the bars to the frame.

Splices.—The circumferential bars were in lengths of from 50 to 55 ft., and were spliced by lapping forty diameters and attaching two Crosby clips at each lap. The strength of this joint was tested by making up sample joints and pulling the bars in a testing machine. Two tests were made on each diameter of bar used, one with bars and clips without any mortar, and the other with the same joint embedded in cement mortar of the same mixture as that used for the walls of the reservoir.

The tests showed that the presence of the mortar did not add materially to the strength of the joint, as it failed either by slippage or by breaking off the clip. The first sign of slippage occurred at a stress of from 18,000 to